IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT(S):   Chan et al.   DOCKET: YOR920020206US1 (8728-587)

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FOR: **SYSTEM AND METHOD FOR EXTERNALIZED INFERENCING COMPONENTS**

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REPLY BRIEF

Applicant submits this Reply Brief in response to the Examiner's Answer dated December 31, 2008.

This Reply Brief is submitted to rebut the rejection of Claims 1 and 36 under 35 USC 101. The reply brief reiterates the arguments presented in the appeal brief with respect to the remaining rejections.

I.   <u>REAL PARTY IN INTEREST</u>

The real party in interest for the above-identified application is International Business Machines Corporation, the assignee of the entire right, title and interest in and to the subject application by virtue of an assignment recorded in the U.S. Patent and Trademark Office.

II.   <u>RELATED APPEALS AND INTERFERENCES</u>

There are no Appeals or Interferences known to Applicant, Applicant's representatives or the Assignee, which would directly affect or be indirectly affected by or have a bearing on the Board's decision in the pending Appeal.

III.   <u>STATUS OF CLAIMS</u>

Claims 1, 3-10, 13, 16-18, 20 and 36 are pending. Claims 1, 3-10, 13, 16-18, 20 and 36 stand rejected and are under appeal. Claims 1 and 36 are the independent claims. Claims 2, 11-12, 14-15, 19 and 21-35 have been canceled. The claims are set forth in the attached Appendix.

IV.   <u>STATUS OF AMENDMENTS</u>

No After Final Amendments have been filed.

V. SUMMARY OF CLAIMED SUBJECT MATTER

In general, the claims are directed to software engineering, and more particularly, to a method and system for employing externalizable inferencing components. Externalization and reasoning, two different rules oriented programming models, each have their own strengths and weaknesses. Each can be applied to the same problem sets where one may have an advantage over the other in certain aspects, depending on the situation. The claimed method and system beneficially utilize both externalization and reasoning together to implement the combined advantages of both models, while at the same time reducing the drawbacks of each.

For purposes of illustration, the claimed inventions will be described with reference to certain Figures and corresponding text of Appellants' Specification, for example, but nothing herein shall be deemed as a limitation on the scope of the inventions. For each Claim listed below, the claim elements are presented in italicized text, and are followed by citation to exemplary figures and/or supporting text in Appellants' Specification (Spec.).

Claim 1 recites:

A computer readable medium embodying a program of instructions executable by a processor to perform a method for deriving knowledge from parameters and data, the method comprising:

passing the parameters to an externalized inferencing component upon executing a trigger point in the program of instructions;

evaluating, by the externalized inferencing component, the data comprising a set of rules to be interpreted against the parameters to perform an inference external to the program of

instructions, wherein the externalized inferencing component is in communication with the

program of instructions, wherein the inference is a derivation of the knowledge;

    storing the knowledge derived by the inference with the data; and

    outputting the knowledge derived by the inference to trigger point of the program of

instructions.

    Support for the subject matter of Claim 1 can be found as follows:

    A computer readable medium embodying a program of instructions executable by a

processor to perform a method for deriving knowledge from parameters and data **(see, e.g.,**

Spec. page 11, lines 12-19; see generally FIG. 1), *the method comprising*:

    passing the parameters to an externalized inferencing component upon executing a

trigger point in the program of instructions **(see, e.g., Spec. page 13, line 22 ~ page 14, line 1;**

page 15 lines 1-3 and lines 5-7; FIG. 2, 220 and 230);

    evaluating, by the externalized inferencing component, the data comprising a set of rules

(see, e.g., Spec. page 16, lines 8-9; page 17, lines 12-20) *to be interpreted against the*

parameters to perform an inference external to the program of instructions, **(see, e.g., Spec.**

page 13, line 22 ~ page 14, line 3; page 15 lines 3-11)

    wherein the externalized inferencing component is in communication with the program of

instructions, **(see, e.g., Spec. page 13, line 22 ~ page 14, line 3; page 14, lines 22-25; page 15,**

lines 3-11; FIG. 2, 210 and 230)

    wherein the inference is a derivation of the knowledge **(see, e.g., Spec. page 15, lines 5-**

11; page 18, lines 22-23);

storing the knowledge derived by the inference with the data **(see, e.g., Spec. page 19, lines 21-24; page 20, lines 14-16);**

and outputting the knowledge derived by the inference to trigger point of the program of instructions **(see, e.g., Spec. page 14, lines 1-3; page 15, lines 3-5).**

Claim 36 recites:

A system for executing a program of instructions in communication with an externalized inference component comprising:

a memory device storing data, the program of instructions and the externalized inference component;

a processor for receiving the data and executing the plurality of instructions and the externalized inference component to perform a method for deriving knowledge from the data comprising:

passing the parameters to an externalized inferencing component upon executing a trigger point in the program of instructions;

evaluating, by the externalized inferencing component, the data comprising a set of rules to be interpreted against the parameters to perform an inference external to the program of instructions, wherein the externalized inferencing component is in communication with the program of instructions, wherein the inference is a derivation of the knowledge;

storing the knowledge derived by the inference with the data; and

outputting the knowledge derived by the inference to trigger point of the program of instructions.

Support for the subject matter of Claim 36 can be found as follows:

A system for executing a program of instructions in communication with an externalized inference component comprising:

a memory device storing data, the program of instructions and the externalized inference component **(see, e.g., Spec. page 11, line 12 ~ page 12, line 1; page 16, lines 1-3)***;*

a processor for receiving the data and executing the plurality of instructions **(see, e.g., Spec. page 11, lines 16-20; page 12, lines 10-18; see generally FIG. 1)** *and the externalized inference component to perform a method for deriving knowledge from the data* **(see, e.g., Spec. page 13, line 22 ~ page 14, line 3)** *comprising:*

> *passing the parameters to an externalized inferencing component upon executing a trigger point in the program of instructions* **(see, e.g., Spec. page 13, line 22 ~ page 14, line 1; page 15 lines 1-3 and lines 5-7; FIG. 2, 220 and 230)***;*

> *evaluating, by the externalized inferencing component, the data comprising a set of rules* **(see, e.g., Spec. page 16, lines 8-9; page 17, lines 12-20)** *to be interpreted against the parameters to perform an inference external to the program of instructions,* **(see, e.g., Spec. page 13, line 22 ~ page 14, line 3; page 15 lines 3-11)**

> *wherein the externalized inferencing component is in communication with the program of instructions,* **(see, e.g., Spec. page 13, line 22 ~ page 14, line 3; page 14, lines 22-25; page 15, lines 3-11; FIG. 2, 210 and 230)**

> *wherein the inference is a derivation of the knowledge* **(see, e.g., Spec. page 15, lines 5-11; page 18, lines 22-23)***;*

storing the knowledge derived by the inference with the data **(see, e.g., Spec. page 19, lines 21-24; page 20, lines 14-16)**;

and outputting the knowledge derived by the inference to trigger point of the program of instructions **(see, e.g., Spec. page 14, lines 1-3; page 15, lines 3-5)**.

VI.   GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A.   Rejections Under 35 U.S.C. § 101

     i.   *Claims 1, 3-10, 13, 16-18, 20 and 36 are rejected under 35 U.S.C. § 101 as*

              failing to be directed to a practical application and in addition for violating

              the doctrine of preemption.

B.   Rejections Under 35 U.S.C. § 102

     i.   *Claims 1, 3-10, 13, 16-18, 20 and 36 are rejected under 35 U.S.C. § 102 as*

              being unpatentable over IBM, "WebSphere Application Server Enterprise

              Services Business Rule Beans (BRBeans)," 2001 (hereinafter referred to as

              "IBM").

VII.   ARGUMENTS

A.   Rejections Under 35 U.S.C. §101

      i.   Claims 1, 3-10, 13, 16-18, 20 and 36

Claims 1 and 36 claim, *inter alia*, "passing the parameters to an externalized inferencing component upon executing a trigger point in the program of instructions; evaluating, by the externalized inferencing component, the data comprising a set of rules to be interpreted against the parameters to perform an inference external to the program of instructions, wherein the externalized inferencing component is in communication with the program of instructions, wherein the inference is a derivation of the knowledge; storing the knowledge derived by the inference with the data; and outputting the knowledge derived by the inference to trigger point of the program of instructions."

Such an application of an externalized inferencing component evaluating parameters passed by a trigger point to perform an inference is believed to be a practical application of a method (embodied in a computer readable medium (see Claim 1) and a system for executing a program of instructions in communication with an externalized inference component (see Claim 36)). Consider that in *Diamond v. Diehr*, 450 U.S. 175, 209 USPQ 1 (1981), the Court noted, "when [a claimed invention] is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of Section 101." *Diehr*, 450 U.S. at 192. In Claims 1 and 36, the claimed computer processes perform inferencing external to a program of instructions, passing parameters by a trigger point for evaluation by an externalized inferencing component to perform the inferencing (external to the program of instructions). Passing parameters to an external inferencing component to perform inferencing, which derives new knowledge from rules and

knowledge (data and parameters), essentially as claimed in Claims 1 and 36, is believed to have practical utility. For example, consider the following:

> "[T]ransformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a <u>practical application</u> of a mathematical algorithm, formula, or calculation, because it produces 'a useful, concrete and tangible result' – a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades." *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601. (Emphasis added)

Furthermore:

> "Practical considerations require the Office to rely on the inventor's understanding of his or her invention in determining whether and in what regard an invention is believed to be 'useful.' Because of this, Office personnel should focus on and be receptive to assertions made by the applicant that an invention is 'useful' for a particular reason." *Nelson v. Bowler*, 626 F.2d 853, 856, 206 USPQ 881, 883 (CCPA 1980).

The present application describes exemplary practical applications in the context of trigger points for orchestrating application behaviors at page 7, lines 12-19, as follows:

"The placement of trigger points at various layers of an application enables corresponding levels of rules abstraction. Centralization of the externalizable logic and data advances the possibilities for understandability, consistency, reuse, and

manageability while coincidentally reducing the maintenance costs of the sundry applications employing trigger points and rules across an enterprise."

In formulating the rejection under 35 U.S.C. § 101, The Examiner states that "the inferencing components and their organization constitute a set of mathematical abstractions of data structure and control flow" while concluding that the claimed invention does not perform "a tangible transformation of real-world entities." (See Final Action, p. 20). Applicants respectfully disagree. As made clear in *State Street*, "transformation of data...through a series of mathematical calculations...constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces 'a useful, concrete and tangible result'..." *Id.* Thus, according to *State Street*, the fact that the performed inferencing implements mathematical algorithms in order to transform rules and knowledge into new knowledge does not render the claimed invention unpatentable under 35 U.S.C. § 101. The claimed invention passes rules and knowledge (data and parameters) from an application to an external inferencing component, which utilizes mathematical algorithms to perform inferencing that <u>transforms the rules and knowledge into new knowledge</u>, which is then used in the application. Under *State Street*, this transformation is clearly a useful, tangible and concrete result of the application of the claimed limitations.

Applicants recognize that in accordance with *In re Bilski* the arguments of *State Street* will no longer be considered dispositive of determinations of statutory subject matter. (See *Ex parte Bo Li*, USPTO BPAI; Nov. 6, 2008). The above arguments are made to show a practical application. Issues related of statutory subject matter can be disposed of on the basis of the "Beauregard" context of Claim 1 and the claimed memory and processor of Claim 36;

"In the analysis of In re Nuijten, 500 F.3d 1346 (Fed. Cir., 2007), the Federal Circuit considers the four statutory classes for a signal, and bases the determination of statutory subject matter on that basis. It has been the practice for a number of years that a "Beauregard Claim" of this nature be considered statutory at the USPTO as a product claim. (MPEP 2105.01, I)." *Ex parte Bo Li*, USPTO BPAI; Nov. 6, 2008.

In view of the foregoing, Claims 1 and 36 are believed to be directed towards statutory subject matter.

Turning now to the suggestion that the claims violate the doctrine of preemption: that is, whether the claim would, in reality, preempt the use of a law of nature or abstract idea. While one may not patent a process that comprises every substantial practical application of an abstract idea, because such a patent in practical effect would be a patent on the abstract idea itself, the claims are clearly presented in terms of a computer readable medium (see Claim 1) and a system for executing a program of instructions in communication with an externalized inference component (see Claim 36). Accordingly, the claims are not directed to mere abstract ideas but include limitations that are both concrete and tangible. Consider the method step of "evaluating, by the <u>externalized inferencing component</u>, the data comprising a <u>set of rules</u> to be interpreted against the parameters to perform an inference external to the <u>program of instructions</u>, wherein the externalized inferencing component is in communication with the program of instructions, wherein the inference is a derivation of the knowledge" (emphasis added), which comprises substantial limitations outside the realm of mere abstraction such as a mathematical formula

without a practical application. While such a limitation may cover a broad range of computer readable mediums and systems for executing a program of instructions, the claims clearly rise above the level of an abstract idea.

Claims 3-10, 13, 16-18 and 20 depend from Claim 1. The dependent claims are believed to be allowable for at least the reasons given for Claim 1. Withdrawal of the rejections under 35 U.S.C. § 101 is respectfully requested.

B.   Rejections Under 35 U.S.C. § 102

i.   Claims 1, 3-10, 13, 16-18, 20 and 36

Claims 1 and 36 are the independent claims.

For a claim to be anticipated under 35 U.S.C. § 102, all elements of the claim must be found in a single prior art reference (see, e.g., Scripps Clinic & Research Found. v. Genentech Inc., 927 F.2d 1565, 1576, 18 U.S.P.Q.2d 1001, 1010 (Fed. Cir. 1991)). The identical invention must be shown in as complete detail as is contained in the claim. (See MPEP § 2131). The single prior art reference must disclose all of the elements of the claimed invention functioning essentially in the same manner (see, e.g., Shanklin Corp. v. Springfield Photo Mount Corp., 521 F.2d 609 (1st Cir. 1975)).

In the case before the Board, Appellants respectfully assert that at the very least, the Final Action fails to present a legally sufficient basis for establishing a *prima facie* case of anticipation as against Claims 1, 3-10, 13, 16-18, 20 and 36: *IBM* teaches externalized business rules (see *IBM*, p. 32). *IBM* does not teach "passing the parameters to an externalized inferencing component upon executing a trigger point in the program of instructions" and " evaluating, by the externalized inferencing component, the data comprising a set of rules to be interpreted

against the parameters to perform an inference external to the program of instructions" as claimed in Claims 1 and 36. The externalized business rules taught by *IBM* make a classification based on logic and data. Respectfully, <u>making a classification based on logic and data is not analogous to the externalized inferencing component</u> claimed in Claims 1 and 36. Nowhere does *IBM* teach inferencing which derives new knowledge from rules and knowledge (data and parameters). Rather, *IBM* teaches business rules that simply return a "value." Returning a value is not analogous to making an inference. For example, consider *IBM*'s maxTruckGrossWeight rule (see *IBM*, p. 33). This business rule, which checks whether a truck weight is valid, compares a truck weight entered by a user with a single, predetermined value representing a maximum truck weight. The rule determines whether the value entered by the user is above or below the maximum truck weight and returns an appropriate value. Nowhere does the rule make an inference <u>deriving new knowledge</u>. Thus, *IBM* does not teach inferencing which derives new knowledge, essentially as claimed in Claims 1 and 36.

In formulating the rejection of Claims 1 and 36 under 35 U.S.C. § 102, the Examiner relies on an interpretation that the Classifier Trigger Point of *IBM* teaches that a value is new knowledge (see Final Action, p. 25). Applicants respectfully disagree. The Classifier Trigger Point taught by *IBM* <u>merely makes a classification based on logic and data</u>. Consider the example of a Classifier Trigger Point given on page 25 of *IBM*. The Classifier Trigger Point receives data (e.g., customers' spending history) and uses this data to classify the customers into different levels (e.g., Gold, Silver and Bronze). <u>The Classifier Trigger Point clearly does not make an inference, nor does it derive new knowledge</u>. Rather, it merely classifies customers into different levels based on logic and data (e.g., if customer spent less than X, classify customer as Bronze; if customer spent more than X but less than Y, classify customer as Silver; if customer

spent more than Y, classify customer as Gold). Externalized business rules, such as the
Classifier Trigger Point taught by *IBM*, and reasoning systems that employ inferencing, are
discussed on pages 7-10 of the present Application. The Application clearly distinguishes
between these two models, stating that "new knowledge is not sought" in the context of
externalization (see Spec., page 7, line 20 ~ page 8, line 2). To illustrate that externalized
business rules do not seek new knowledge, an example analogous to *IBM*'s Classifier Trigger
Point example (*IBM*, p. 25) is given (see Spec., page 8, lines 3-12 – e.g., a rule classifying a
frequent flier to be bronze, silver, or gold based upon the number of miles flown with the airline
during one year is an <u>externalized business rule and does not seek new knowledge</u>).
Accordingly, externalized business rules such as *IBM*'s Classifier Trigger Point <u>merely make a
classification based on logic and data</u>, and do not perform inferencing which derives new
knowledge from rules and knowledge (data and parameters), essentially as claimed in Claims 1
and 36. Thus, *IBM* does not teach inferencing which derives new knowledge, essentially as
claimed in Claims 1 and 36.

      Further, the Examiner interprets the dependent rules taught by *IBM* (see *IBM*, p. 21) as
teaching "that inferencing derives new knowledge (especially used to classify situations) from
rules and knowledge (data and parameters)." (See Final Action, p. 25). Applicants respectfully
disagree. Although the Examiner asserts that *IBM*'s dependent rules teach that inferencing
derives new knowledge, it is never explained how this is done. *IBM* teaches dependent rules,
which are rules triggered by other rules. Regardless of the manner in which these rules are
triggered, they are still externalized business rules that do not seek new knowledge, and instead
<u>merely make a classification based on logic and data</u>. Every dependent rule called upon by

another rule is simply returning a value; no inference is ever made. Thus, the dependent rules of *IBM* do not teach inferencing that derives new knowledge.

The Examiner's rejection under 35 U.S.C. § 102 further relies on an interpretation that an IF/THEN statement, as taught by *IBM*, is analogous to the claimed inferencing which derives new knowledge (see Final Action, p. 26-27). Applicants respectfully disagree. *IBM* teaches an IF/THEN statement that is used only in classification. *IBM* does not teach "evaluating, by the externalized inferencing component, the data comprising a set of rules to be interpreted against the parameters to <u>perform an inference</u> external to the program of instructions, <u>wherein the inference is a derivation of the knowledge</u>" (emphasis added) as claimed in Claims 1 and 36. The IF/THEN statement of *IBM* is a conditional statement that lacks inherent inferencing capabilities. That is, the IF/THEN statement of *IBM* is merely a logical argument that <u>cannot be considered an inference as it, by itself, does not derive knowledge</u>. Indeed, it is instructive that *IBM* does not use the word "inference" or its derivatives. Further, consider that the claimed <u>inferencing component</u> of Claims 1 and 36 is comprised of more than a mere IF/THEN statement (see FIG. 5 of the present application, illustrating an inferencing component comprised of multiple rule sets and algorithms). Thus, the IF/THEN statement of *IBM*, on its own, lacks complexity for deriving knowledge. In view of the foregoing, the teachings of IBM are not analogous to an externalized inferencing component performing an inference external to the program of instructions, wherein the inference is a derivation of knowledge, essentially as claimed in Claims 1 and 36.

Therefore, *IBM*, fails to teach all of the limitations of Claims 1 and 36.

Claims 3-10, 13, 16-18 and 20 depend from Claim 1. The dependent claims are believed to be allowable for at least the reasons given for Claim 1. Withdrawal of the rejections under 35 U.S.C. § 102 is respectfully requested.

C.   Conclusion

In view of the foregoing, it is respectfully requested that the Board overrule the rejections of Claims 1, 3-10, 13, 16-18, 20 and 36.

Respectfully Submitted,

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VIII. CLAIMS APPENDIX

1.   A computer readable medium embodying a program of instructions executable by a
processor to perform a method for deriving knowledge from parameters and data, the method
comprising:

passing the parameters to an externalized inferencing component upon executing a trigger
point in the program of instructions;

evaluating, by the externalized inferencing component, the data comprising a set of rules
to be interpreted against the parameters to perform an inference external to the program of
instructions, wherein the externalized inferencing component is in communication with the
program of instructions, wherein the inference is a derivation of the knowledge;

storing the knowledge derived by the inference with the data; and

outputting the knowledge derived by the inference to trigger point of the program of
instructions.

2.   (Canceled)

3.   The method of claim 1, wherein the data is stored in persistent memory external to the
program of instructions.

4.   The method of claim 1, wherein the externalized inferencing component includes at least one of a short term fact, an inference rule, an inference engine, a static variable mapping, a sensor, an effector, a long term fact, and a conclusion.

5.   The method of claim 1, wherein the externalized inferencing component includes at least one of a short term fact component, an inference rule set component, an inference engine component, a static mapping component, a sensor component, an effector component, a long term fact component, and conclusion component.

6.   The method of claim 2, wherein the externalized inferencing component is one of a consumer of data provided by an inferencing component, a supplier of data provided by an inferencing component, and a combination thereof.

7.   The method of claim 1, further comprising the step of associating the trigger point with the program of instructions.

8.   The method of claim 4, wherein trigger points operate either synchronously or asynchronously.

9.   The method of claim 1, wherein the externalized inferencing component is a master inferencing component that employs at least one other externalized inferencing component.

10. The method of claim 1, wherein the externalized inferencing component employs an inferencing engine.

11.-12. (Canceled)

13. The method of claim 1, wherein the externalized inferencing component is composed of at least one inferencing subcomponent.

14.-15. (Canceled)

16. The method of claim 1, further comprising sharing the externalized inferencing component by reference with at least one other externalized inferencing component.

17. The method of claim 1, wherein the externalized inferencing component performs method steps to one of create, update and delete another externalized inferencing component.

18. The method of claim 1, wherein an algorithm of the externalized inferencing component for performing the evaluation is shared by a plurality of externalized inferencing components.

19. (Canceled)

20.   The method of claim 1, further comprising providing an inference component management facility to administer externalized inferencing components, the administration including operations to create, retrieve, update, and delete.

21.-35. (Canceled)

36.   A system for executing a program of instructions in communication with an externalized inference component comprising:

a memory device storing data, the program of instructions and the externalized inference component;

a processor for receiving the data and executing the plurality of instructions and the externalized inference component to perform a method for deriving knowledge from the data comprising:

passing the parameters to an externalized inferencing component upon executing a trigger point in the program of instructions;

evaluating, by the externalized inferencing component, the data comprising a set of rules to be interpreted against the parameters to perform an inference external to the program of instructions, wherein the externalized inferencing component is in communication with the program of instructions, wherein the inference is a derivation of the knowledge;

storing the knowledge derived by the inference with the data; and

outputting the knowledge derived by the inference to trigger point of the program of instructions.

IX.   <u>EVIDENCE APPENDIX</u>

(None)

X.   <u>RELATED PROCEEDINGS APPENDIX</u>

(None)